

MISCELLANEOUS.

Correction to p. 521 ('Annals,' June 1895).

SINCE I drew up (on the 19th of April) the description of the new Batrachian discovered by Mr. Quelch, I have seen the number of the 'Zoologischer Anzeiger' for April 8, in which Prof. O. Boettger describes a new Engystomatoid genus from Halmaheira under the name of *Oreophryne*. I therefore propose to change the name suggested by me to *Oreophrynella Quelchii*.—G. A. BOULENGER.

On the Production of Males and Females in Melipona and Trigona.

By J. PEREZ.

The few observations that we possess on the subject of the inner life of colonies of *Melipona* and *Trigona* were such as to lead us to suppose that, in the case of these exotic bees, the production of sexual individuals, males and females or queens, does not present any essential difference from what we know to take place in that of the hive-bee. As a matter of fact, among the large number of species of *Melipona* and *Trigona* there are some in which the phenomena take place in a precisely similar manner, and the young queens are found existing in the nest at the same time as the males. This is the case, for instance, in *Melipona scutellaris*, of which I have observed simultaneously a number of individuals of both sexes at the close of autumn, a few days before the whole colony was destroyed by the cold.

On the other hand, a nest of *Trigona clavipes*, Fabr. (*quadrangula*, Lep.), throughout the many weeks during which I was enabled to observe it, contained a fairly large number of males and not a single young female.

From the observation of a little *Trigona* from Uruguay, which I succeeded in keeping from the commencement of November 1891 until the middle of October 1894, and which consequently passed through three summers under my eyes, I have learnt some facts that were entirely unexpected.

During the first year the colony produced nothing but workers. Though I was every day on the watch, so to speak, for the slightest differences that might appear in the shape and dimensions of the freshly constructed cells, and lead one to suppose that a queen- or male-cell was being produced, I never noticed anything peculiar in the building operations, and never witnessed the emergence of any but workers.

The following year (1893), about August 10, I noticed in the centre of a comb in course of construction a cell wider and taller than the ordinary ones, above the level of which it projected by about a millimetre and a half. On August 28 the cell was open, and I soon discovered the young queen which had emerged from it, and which, owing to her light colour still more than to her size, was conspicuous against the black background formed by the population of the colony. She lived in the nest until the end of September, when she disappeared, having gone out during bright sunshine to take,

according to the expression customary in apiculture, her nuptial flight, which, however, was rendered useless by the absence of males. She did not return. Nothing more took place during the year: not a single other female nor any male emerged.

In 1894 a female cell was constructed on June 15, and several others were built in the course of July; but none came to any good. A parasitic disease seemed to have attacked the colony; many larvæ died in their cells, and they soon perished in numbers every day: the queen herself was attacked, and succumbed at the commencement of October, while the last workers died a few days later. No male had yet appeared.

It was important to see whether the workers, which were still fairly numerous when the queen died, would not set to work to make a new one for themselves, as normally happens in the case of our hive-bees when accidentally bereft of their egg-producer. Nothing of the kind took place, and this was, *à priori*, to be foreseen. In the case of the hive-bee the larvæ are fed according to their daily wants, so that, when the queen happens to disappear, the workers have only to supply some larva with the *royal jelly*, instead of the paste that produces the workers, and the selected larva, which would have become a worker, will develop into a queen. In the case of *Melipona* the cell when constructed is immediately provisioned, and receives the whole of the food necessary for the development of the larva; the queen deposits an egg in it, and the cell is at once sealed up. The larva that will be hatched in the cell will therefore develop entirely removed from any intervention on the part of the workers, and the destiny of the future bee is consequently irrevocably fixed from the very beginning. As a matter of fact, no change was made in the cells already constructed. *Trigona* is incapable of replacing, as the hive-bee does, the vanished mother of the nest.

An interesting point still to be determined was whether, as appears to be the case in certain instances, but not always, in our common bees when they have lost their queen, the faculty of oviposition would be manifested by some of the workers. Building operations were continued for several days longer; a few large queen cells were constructed at the edge of the last comb and received their store of paste. In this task the workers displayed very great activity, and often waited several hours while the queen visited the cells to perform her function. Eventually they became tired; the paste was soon delivered up to pillage, and consumed in a few moments. More than once the cells were sealed up, and it was possible to believe that an egg had been deposited in them by a worker which I had not succeeded in detecting in the act. Before long, however, the cells were reopened and the contents devoured. After being provisioned and sealed up afresh, they again underwent the same fate. Then all operations ceased, and the workers succumbed one after the other.

To recapitulate: in the space of three years a colony of *Trigona* produced a queen in the second, and virtually several queens in the third year, but never a single male. Since observations were arrested by the premature death of the queen, we are left in doubt

as to whether she would have continued throughout her life to produce only females, or whether, at a more advanced age, her progeny would have been males, as was seen in the colony of *Trigona clavipes*, mentioned above. In any case the non-simultaneous production of individuals of the two sexes in one and the same colony points, in certain species of Meliponids, to the indispensable intervention of cross-fertilization, the advantages of which are well known to naturalists.—*Comptes Rendus*, t. cxx. no. 5 (February 4, 1895), pp. 273–275.

On the Development of the Body in the Prawn (Palæmon serratus, Fabr.) and the Crayfish (Astacus fluviatilis, Gesn.). By LOUIS ROULE.

For several years past I have prosecuted researches upon the development of the two crustaceans mentioned in the title of this note. The facts that I have observed are for the most part known; but several of the principal among them have not been described with great accuracy, and the interpretations that have been given of them seem to me to be incorrect.

The ovum of these animals is chiefly composed of food-yolk; the formative yolk, at the moment of fertilization, collects into a little cicatrice, which alone produces all the elements of the embryonic economy. Contrary to what happens in the case of *Porcellio*, to the embryogeny of which I have devoted a recently published memoir*, the cicatrice does not commence by surrounding the entire ovum, to give rise afterwards to the appendages; it develops on the spot and increases slowly, while giving rise in succession to the organs and the paired limbs. The ovum of *Porcellio* is globular; the young embryo is itself spherical from the very first; it subsequently elongates, increasing in size principally in the direction of the future longitudinal axis, and thus arrives at its definitive condition. The case is different both in the prawn and in the crayfish. At the very commencement of the embryonic development of these latter forms the cicatrice divides, following a plane almost tangential to the surface of the ovum, into two superimposed parts. This cleft commences as a superficial depression, which extends across and sinks little by little into the cicatrice, dividing it in such a way that the latter, instead of remaining full and compact, appears divided into two halves, one of which is folded back beneath the other. This arrangement persists, while the cicatrice increases in size, giving rise to the appendages and the organs; the halves enlarge and preserve their relations, one of them being tucked beneath the other. Finally, when the development is concluded and the body formed, the latter lies bent double: the portion folded back corresponds to the abdomen, and the other to the cephalothorax. At the moment of hatching the curvature is effaced by the straightening of the whole, and the abdomen, assuming its

* "Études sur le développement des Crustacés."—Ire Partie; Ire Mémoire: "Étude sur le développement du Cloporte (*Porcellio scaber*, Leach)." *Annales des Sciences naturelles, Zoologie*, 1894.